Blockchain Technology Applications and Cryptocurrencies: Current Practice and Future Trends

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Abstract

There are several benefits to using technology to create new methods. Blockchain technology delivers openness and a secure mechanism for business solutions. By examining contemporary commercial opinions, instances, and research, it also focuses on the energy industry and the state of the economy. In bitcoin, the transaction is finished after the miner adds the transaction information to the blockchains that are processed. On the other hand, creating a suitable bitcoin method, which takes time, is essential. The gaming industry is seeing an increase in the use of cryptography, which presents a significant potential for study and evaluation collaboration with platforms to define the operation. This experimental investigation's main goal is to investigate how widely used cryptocurrencies like Bitcoin and blockchain technology are in India. Researchers can learn more from the investigation about the prospect, risks, and potential applications of blockchain within the Indian public industry. This research was done to gather crucial data from Indian citizens using an online data collection technology to meet the research objectives. Descriptive statistics and SEM have thus been used to investigate the causative link between explanatory variables and individuals' intent to utilize given the sample size of (n = 376). According to this research, knowledge and perceived trust are two relatively important characteristics that influence whether or not people plan to utilize Bitcoin in the future.

Keywords: Blockchain, cryptocurrency, bitcoin, application, and adoption.

Introduction

Blockchain technologies and cryptocurrencies are currently areas of significant importance that academics, professionals, and the IT sector ought to think about, analyze, investigate, publish, create, exploit, and use [1]. Blockchain is indeed a revolutionary and intriguing technology since it lowers the chance of theft, eradicates security problems, and increases transparency on a level that has never been witnessed

previously. In 2009, blockchain was put into practice after initially being proposed in 2008 [2]. Nevertheless, it is believed that the financial sector is the main user of blockchain applications.

Nowadays, blockchain technology is used for more than just digital money. It is also used in healthcare, government, supply-chain management, agricultural sectors, real estate, global relations, and nearly every other application that relies on databases and could be overtaken by a quite safe, unchanging, consensus, straightforward, and trust-oriented database [3]. Other blockchain-based applications are sprouting outside of the FinTech space in every business and sector as everyone looks to benefit from the unique qualities of blockchains highlighted in the preceding statement [4].

As a peer-to-peer (P2P) computerized record-handling system, the blockchain acts as a distributed database that does not require a centralized entity, providing identification and verification to the transaction that represents logged activities. The transactions are kept in a developing collection of entries known as “blocks” which are connected via a cryptographic process [5]. Distributed control systems (DCSs), which seem to be typically complicated processes for plant management comprising actuators and sensors located in many localities, also necessitate the special characteristics of blockchain. Conventional DCS emerged from centralized power and has a weak central command unit for observing the entire network [6]. It also has significant risks, such as severe security and privacy concerns, which pose a possibility of being hijacked by outsiders. The highly decentralized structure and security assurance of blockchain gives it significance in DCS uses. The crucial component for performing the security screening is its decentralization [7].

Recent years have seen a significant increase in corporate and academic interest in cryptocurrencies. Cryptocurrencies are "digital currencies" that are convertible into any widely used physical currencies yet do not reside in the physical world. The first cryptocurrency, bitcoin, was created as a show of resistance. Over the course of their brief existence, cryptocurrencies have changed irregularly and at a rapid pace. Over 1,600 cryptocurrencies have indeed been created since the launch of Bitcoin in 2009, the bulk of which have found success in the market [8]. The potential for online trade has increased dramatically with the rise of cryptocurrencies. The stock exchange for Bitcoin, which is frequently referred to as the initial cryptocurrency, reached $10 billion in 2016 [9]. The foundational component of Bitcoin is the blockchain.

Research Objective

- The main aim of this research is to experimentally analyze the application of blockchain technologies and cryptocurrency's current position in India.
- To investigate the benefits, scope, and implementation of blockchain technologies in Indian public sectors.
- To examine the various elements that influence a person's interest in adopting Bitcoin as the novel application of cryptocurrency in India's banking and economic structures.

Hypothesis Testing for Blockchain

H1a: Adopting blockchain in the Indian public industry would be beneficial.

H10: Adopting blockchain in the Indian public industry would not be beneficial.

H2a: The Indian government will support blockchain technology.

H20: The Indian government will oppose blockchain technology.

Hypothesis Testing for Cryptocurrency

H1: Awareness and willingness to the application of Bitcoin are positively correlated.

H2: The intention to adopt Bitcoin and the perceived convenience of the application are positively correlated.

H3: Intent to utilize Bitcoin and perceived utility has a favorable association.

H4: The link between the perceived convenience of application and intent to utilize bitcoin is somewhat mediated by the perceived utility.

H5: Intention to the application of Bitcoin and perceived trust have a favorable link.

Literature Review

According to research [10], money is any object that is commonly used to pay for commodities and services or satisfy current agreements. We can shed light on characteristics like longevity, divisibility, compliance, consistency, defined worth, and generalization [10] by considering the past viewpoint of money. Trading begins with more fluid yet valuable commodities like silver and gold. Subsequently, it has been changed into fiat money and paper money. Money's increased liquidity enabled the possibility ofto purchasing commodities and services quickly [11]. Due to their extremely liquid form and innovative perspective on money, cryptocurrencies like Bitcoin are fresh models of the world's financial network. They have lower transactions and identification expenses.

India's digital economy has had significant growth over the last ten years, and it will continue to expand rapidly in the years to come. The arrival of digital payments, Bitcoin, and other cryptocurrencies has caused a significant change in the way transactions are carried out in the financial and banking industries [12]. According toBanwari (2017), the value of Bitcoin has increased exponentially from mere $0.04 in early 2008 to $19,700 in late 2017 [13]. The inaugural cryptocurrency, Bitcoin, was launched in 2009. As of December 2017, there are currently 1380 of these cryptocurrencies in use with a market worth of $550 billion.

As per [14] blockchain is a revolutionary intrusion in the complete transaction administration system, guaranteeing trade, rights, and confidence. Despite the advancements in digitization, there is still a risk of theft when using electronic transactions. To increase consumer confidence, a productive analysis of technology, such as Blockchain, will show other ways that it can be utilized safely. Speed, Confidentiality, Safety, Absence of Regulation, Adherence and Competent, Personnel, Ethical and Legal Issues, Absence of Standard Verification and Understanding, Versatility, and other issues are a few of the key hindrances to the application of blockchain in public industriesof India [15].

It is assumed that all businesses and economies might be transformed by blockchain technology, according to experts [16]. Blockchain is predicted to increase corporate value by $3 trillion annually by 2030. By 2025, 10 percent of the nation's GDP, according to the World Economic Forum, is expected to be maintained on blockchain technology. The WEF also adds that blockchain is among the seven breakthroughs that will alter people's daily lives and transform the way we live. As blockchain adoption grows on a worldwide scale, India has seen its significance and is researching this innovation in a variety of fields. In India, there has been an increasing demand for the widespread application of booming technologies.

BFSI dominates in India when it comes to implementation, but other sectors like medical, retail, and production are coming up. In India, the administration is crucial both as a user of blockchain technology and as a regulator. In India, almost 50% of the states have started blockchain initiatives to tackle various aspects of providing citizen services [17]. Although the majority of activities are still in the trial phase, the state authorities have adopted a proactive strategy to make sure entrepreneurs and specialized providers have a supportive environment to take part in these projects.

As per [18], new wave of cryptocurrency is transforming the cross-border transaction industry by utilizing blockchain technology to develop overseas transactions simpler, and quicker. Over 100 banks & other financial institutions have been introduced to its system. This technology can be employed to circumvent the weaknesses in cyber-attacks within cross-border transactional financial services. The generation and reconciliation of several documents for currency transactions for the broker, buyer, clearer, seller, and 3rd parties are aspects of international exchange transactions. Foreign currency Cobalt DL, a blockchain firm, uses blockchain to remove numerous trade documents [19]. Technology is significantly more effective than the current network since it would eliminate pointless license costs, registration costs, overheads, and so on.

Presently, the government sectors in India are working on more than 40 blockchain applications, with 92% of them still in the pilot stage and 8% of them in the manufacturing stage [20]. The bulk of the activities began in early 2018, therefore the advantages of these activities will not be felt

until after 2019 at the earliest. Initiatives in the POC stage grew seven times, while those in the trial stage climbed six times, as compared to 2017 [21]. When it comes to blockchain usage in India, the governments of Andhra Pradesh and Telangana are at the top of the list.

Methodology

As was previously indicated, the purpose of this investigation was to examine the potential and current position of blockchain technology and cryptocurrencies to determine whether they represented a workable method of conducting business in the future. This secondary data was gathered with the idea that the usage of blockchain technologies in the Indian public sphere is anticipated to be impacted by a variety of distinct variables. Individuals were handed a thorough yet succinct document titled "Blockchain technologies in the Indian public sector" to fully comprehend the subject and determine how users now feel about Blockchain.

This study's experimental context is situated in Chennai, the main city of Tamil Nadu, India, where a sizable populace plays online games and benefits from the rich expertise of utilizing cryptocurrency, or Bitcoin, for gaming. We undertook an attempt to investigate how people perceived the application of the usage of Bitcoin as a novel kind of money. It enables people to feel more at ease with their daily payments. In this experimental study, we utilized anorganized questionnaire employing a 7-point scale of Likert to gather the necessary data about Chennai city of Tamil Nadu. The questionnaire is regarded as an essential component of data collecting, and by highlighting the significance of this research, we aimed to reduce response error. Citizens of Chennai metropolis served as the test's targeted population. We went to numerous locations where people play online games, including internet cafes. Additionally, we gathered information from people who are familiar with and have utilized Bitcoin.

This research has used both descriptive and exploratory investigation methods. The investigation employed convenient and selective sampling techniques. SPSS software is used to summarize and analyze the obtained data. The primary statistical methods employed in the research are measurements of central tendency. To evaluate the study hypotheses, an ANOVA was performed. Also, in contrast to the calculation of the Mean and the One-Way T-test was performed. To confirm study scale and data authenticity, path analysis has been carried out in AMOS version 21 utilizing structural equation modeling (SEM). To quantify the influence of different categories on people's intentions for the application of Bitcoin as a form of exchange, we used SEM. Figure 1 gives proposed the research framework for analysis of people's behaviour towards the use of cryptocurrencies.

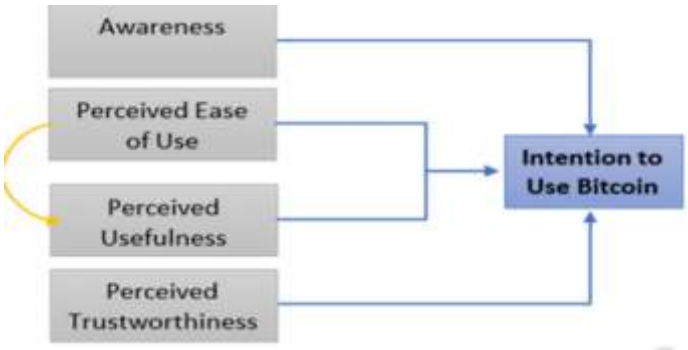

Figure 1: Research framework of cryptocurrency

Anova

R. A. Fisher developed the quantitative technique characterized as ANOVA-analysis of variance, whose framework for application in the agricultural investigation will be utilized in this study. This approach was commonly utilized to determine if the independent and dependent variables show any statistical difference. The statistical technique known as ANOVA is used to ascertain if the mean of two or more groups differs significantly from each other. To investigate the impact of one or more variables, ANOVA analyzes the mean of distinct samples. The t-test is another metric used to compare the datasets. T-test and ANOVA get the same findings when there are only two data. A t-test would not be accurate if there were more than 2 samples, though. The failure rate of the outcome will increase if we perform numerous t-tests to compare greater than 2 samples [22].

Hypothesis Testing

We can presume that there are only two outcomes when using a medicine example: either the drug will affect the

sufferers or it won't. These assertions are referred to as hypotheses. An established assumption regarding something in the immediate context is what we refer to as a hypothesis.

It must be capable of being tested by investigation or inference. ANOVA and SEM utilizes a Null hypothesis and an Alternate hypothesis similar to any other form of hypothesis you may have encountered in statistics. When all of the sample means are the same or don't differ significantly from one another, the null hypothesis in an ANOVA is admissible. They can be viewed as a member of a wider group of the population as a result. On the contrary, the alternative hypothesis is true if at least one sample mean differs from the others. They can be expressed mathematically as follows:

$$H0: \mu 1 = \mu 2 = \cdots \mu i \qquad Null\ hyphothesis$$
$$H1: \mu i \neq \mu m \quad alternate\ hyphothesis$$

where,μi and μm among all the samples included in the test corresponding to either two groups' mean. In other terms, the null hypothesis claims that either all sample means are identical or the factor had no discernible impact on the outcomes. In contrast, the alternative hypothesis claims that at minimum one sample mean differs from the others. But it's still unclear which one it is in particular. Other techniques, which we shall cover later in this chapter, will be employed for that.

F-Statistic

The F-Ratio is a measure that assesses whether or not the mean of various datasets varies dramatically. The more closely the sample means are, the lower the F-Ratio. If so, we are unable to rule out the null hypothesis.

$$F = \frac{Between\ group}{within\ group}$$

This technique is rather simple to understand. The between-group variance is defined by the numerator term used in the F-statistic computation. As we previously learned, a sample means to become more unlike one another as between-group variability rises. In other terms, there is a higher likelihood that the samples come from completely distinct populations. This F-statistic is computed here, and a result is drawn by comparing it to the F-critical value.

Suppose that there is independent, evenly-spaced random factors. Assuming that each of these randomized factors possesses the identical, yet unidentified, standard deviation and can be grouped together into the r set (i=1, 2,..., r) with the identical anticipated value, the randomized factors in the group possess the distribution N $(;\sigma)$. Let's indicate the th group's total count of randomized factors.

This statistical framework relates to the experimental inquiry described below: we take a simple example from each of the r groups where feature x has a regular distribution having identical standard deviation $(;\sigma)$. & anticipated values, accordingly.

Assume that the purpose of the case inquiry is to evaluate the hypothesis. (), which postulates that all of the randomized factors under consideration possess similar distributions because all of the anticipated outcomes are equivalent.

The issue would be limited to evaluating the hypothesis if there were just two groups ( ).

Test statistic,

Step 1: Correction Factor $= CF = \frac{(GT)^2}{N}$

Step 2: Total Sum of Square $= TSS = \sum x_i^2 - CF$

Step 3:BSS-Between Sums of Squares

$$BSS = \left[\frac{(\sum x_1)^2}{n_1} + \frac{(\sum x_2)^2}{n_2} + \frac{(\sum x_3)^2}{n_3} + \frac{(\sum x_4)^2}{n_4}\right] - CF$$

$$\left[\frac{(\sum x_1)^2}{n_1} + \frac{(\sum x_2)^2}{n_2} + \frac{(\sum x_3)^2}{n_3} + \frac{(\sum x_4)^2}{n_4}\right] - CF$$

STEP D: TSS – BSS = Error Sum of Square

Step 4: Preparation of table of ANOVA.

The disparity (— in other words, k-1 & N-1), (MS) mean square, P-value, and F value are recorded in the ANOVA table. Lastly, we conclude with the important differences between the groups.

Result And Discussion

Demography: The demographic representation of all the respondents is given in Table 1. Most of the respondents were male (85.4%) with a smaller number of females (55). About 50% of respondents were in the age range of 30-39 years and about 57.7% of all the respondents were graduates.

Table 1: Outcomes of demographics

Group	Rate	Percent %
Female	55	14.6
Male	321	85.4
Sum	376	100
Above 50 years	25	6.6
40-49 years	36	9.6
30-39 years	188	50
20-29 years	127	33.8
Sum	376	100
Uneducated	4	1.1
UG	62	16.5
Graduate	217	57.7
PG	50	13.3
Other educations	43	11.4
Sum	376	100

Analysis of Applications of Current Practice of Blockchain Technologies

The growth of blockchain technology over the past few years as illustrated in the figure 2, gives a fair idea of its increasing significance in the business industries. The figure shows that, the estimated capital market spending on blockchain technology increased from $75 in 2015 to $400 in 2019 i.e a huge increase of almost 400% in a short time period of only five years

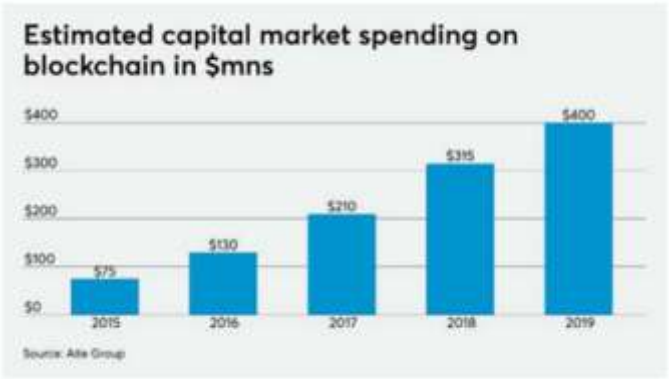

Figure 2: Application of blockchain technology in the capital market

Table 2: In the event where F > F crit, the null hypothesis is rejected. Therefore, we conclude that the Indian public sector will gain from the application of blockchain technologies.

Categories	Counts	Total	Average	Variance		
1	5	42	8.4	10.3		
2	5	33	6.6	21.3		
ANOVA						
Variation source	Df	SS	MS	P-value	F	F-crit
Within group	8	126.4	15.8	0.494	0.512	5.317
Between-group	1	8.1	8.1			
Sum	9	134.5				

Table2 shows that there are different statistics for each category, including total, average, and variance. If the null hypothesis is valid, there is a 0.494 percent chance of achieving an F value of 5.31 or higher, as shown by the p-value. The null hypothesis, which states that blockchain technology applications will not benefit the Indian public sector, is rejected as the p-value is less than the required alpha of 0.05. Therefore, it can be concluded that people believe blockchain technology should be implemented in government. The outcomes for the research hypothesis, "Adopting blockchain in the Indian public industry would be beneficial" are displayed ahead, and they demonstrate that the F-value remained below the barrier of 5.31, indicating that blockchain technologies will indeed be helpful for the Indian public sector.

Table 3: In the event where F > F crit, the null hypothesis is rejected. Therefore, it follows that government will favor the implementation of blockchain technology.

Categories	Counts	Total	Average	Variance		
1	5	43	8.6	11.3		
2	5	20	4	1		
ANOVA						
Variation source	Df	SS	MS	P-value	F	F-crit
Within group	8	49.2	6.15	0.018	8.601	5.317
Between-group	1	52.9	52.9			
Sum	9	102.1				

Table 3 shows that there are different statistics for each category, including total, average, as well as variance. If the null hypothesis is valid, there is a 0.018 percent chance of

getting an F value of 5.317 or higher, as shown by the p-value. The null hypothesis, which states that the Indian government will not promote blockchain technology applications, is rejected as the p-value is less than the acceptable alpha of 0.05. Thus, it can be concluded that people believe the Indian government will favor blockchain technological applications. The findings for this research hypothesis, "The Indian government will support blockchain technology " are displayed above, and they demonstrate that the F-value remained below the threshold of 5.317, indicating that the Indian government will embrace blockchain.

Analysis of Application of Current Use of Cryptocurrency

Following the application of path analysis, Figure 3 shows a standardized estimation of the regression values when employing SEM. Path coefficient values are substantial and optimistic, indicating a favorable link between the independent and dependent variables. The dependent variable's square of R-value is 0.51, which explains 51% of the variation resulting from a few chosen explanatory factors, demonstrating that the model fits the data well.

Figure 3's findings for the path assessment beta coefficient show a positive correlation between awareness and intention for the application of Bitcoin, having (b = 0.229) being significant at the 0.001 thresholds of statistical significance. The results for perceived convenience of application are (b = 0.353 and 0.125), accordingly, and they have a strong relationship with perceived utility and intention for the application of Bitcoin. Similarly, regarding the applicability, trustworthiness has a strong positive correlation with the intention for the application of bitcoin, with beta coefficient levels of (b = 0.236, and 0.330), accordingly. Age and gender are utilized as the control variables, however, there was no discernible association between them as well as the dependent factor. Depending on the aforementioned findings, and as indicated in Table 4, the conceptual framework of this research is significant.

Table 4: Outcomes of hypothesis

Hypothesis	Outcomes
H1: Awareness and willingness to the application of Bitcoin are positively correlated	Validated
H2: The intent to adopt Bitcoin and the perceived convenience of the application are positively correlated.	Validated
H3: Intention to utilize Bitcoin and perceived utility has a favorable association.	Validated
H4: The link between the perceived convenience of application and intent to utilize bitcoin is somewhat mediated by the perceived utility.	Validated
H5: Intention to the application of Bitcoin and perceived trust have a favorable link.	Validated

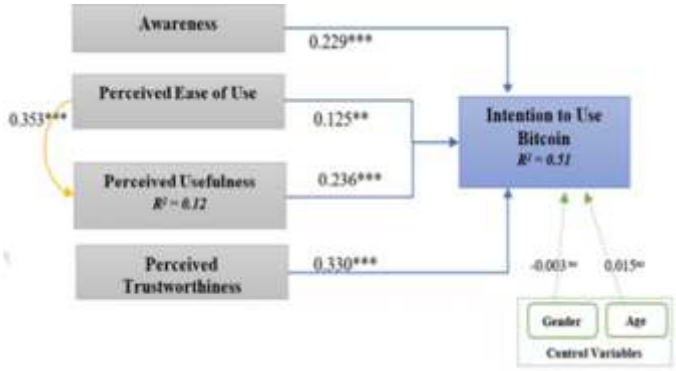

Figure 3: Outcomes of SEM path assessment for the hypothesis testing

Table 5:Outcomes from a bootstrapping indirect impact

Independent factor	Mediation	Dependent factor	Direct impact	Indirect impact	Outcomes
Perceived convenience of application	Perceived usefulness	The desire to the utilization of application of Bitcoin	0.125**	0.083***	Partial mediation validated

Indication: Bootstrapping approach to mediation. Significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Additionally, the current research establishes the mediation function of perceived effectiveness to investigate mediation impacts in the connection between perceived convenience of application and intent to utilize Bitcoin. The mediation variable's R-Square is 0.12, constituting the 12% fluctuation between the mediation connection discussed previously. We used the bootstrap technique to discover a

mediation impact in this research environment to investigate the mediation role of perceived utility. The results of the bootstrap assessment for the indirect consequence, which demonstrates the perceived usefulness' substantial beneficial impact as mediation at a 95 percent bootstrapping interval, are shown in Table 5. The limited behavior of this mediation is shown by the substantial positive connection between the perceived convenience of application and an independent factor.

Conclusion

The old financial system's limiting instruments are unable to achieve the global aims being implemented in the digital market. Regarding adoption in the existing or a new economic structure, the future of the Cryptocurrency market and Blockchain technologies is uncertain. On the contrary, Bitcoin's faceless nature makes it more difficult to adopt and presents a legal problem for governments. As a result, that nation declines to accept the legalization of currency that is independent of state financial entities. Bans on Bitcoin & similar cryptocurrencies have been suggested in some nations, such as India. This will make it more difficult for people to use and embrace bitcoin. The main goal of this research was to determine whether individuals would embrace this breakthrough in the financial sector.

After conducting an in-depth study on blockchain technology, its application, and cryptocurrency in the Indian Public System, this research has concluded that there are several benefits to utilizing this technology. The preservation and entry of data will be revolutionized by the groundbreaking technology known as the blockchain. As was already indicated in the study, there are numerous benefits to the blockchain, and its adoption would increase accountability and transparency in the Indian public system. The application of Blockchain is energy-intensive, which would tremendously raise the cost of energy. An additional issue with this technology is that the Indian government does not yet have the infrastructure necessary to utilize it. Since blockchain is a brand-new technology, not many people are aware of it. Making this technology a crucial component of the Indian sector would require a lot of work, resources, and the correct mindset of embracing transformation. These findings demonstrate a substantial positive correlation between awareness, perceived convenience of use, utility, trustworthiness, and Indians' propensity to utilize Bitcoin. Outcomes from bootstrapping showed that perceived usefulness had a partial mediating influence on the relationship between perceived convenience of application and intention to adopt Bitcoin. The current notion of technology acceptance was also established and confirmed by the observed trust ($b = 0.330$), which is a crucial component of technological dissemination. Depending on the experimental findings and the setting of this research, we can say that Indians are keen to use Bitcoin as a form of trade if they are well-informed about its uses and functionalities and have a high degree of trust in it. Regarding the Indian government, which opposes the development of such an unregulated financial network, this may decrease trust, which would eventually lead to a decrease in people's intentions to use Bitcoin as a form of payment. This will also hinder Bitcoin's anticipated development and significance inside the worldwide financial network.

As a result, this research suggests to the Indian government take into account using this technology and prepare to implement it gradually. We believe that educating the general public regarding this innovation and its advantages must be the initial step subsequently gradually introducing this technology across various states and sectors.

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Authors' contributions

All authors contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all the aspects of this work.

Declaration of Conflicts of Interests

Authors declare that they have no conflict of interest.

Consent for Publication

All authors read and aware of publishing the manuscript in Pacific Business Review International

Data Availability Statement

The database generated and /or analysed during the current study are not publicly available due to privacy, but are available from the corresponding author on reasonable request.

Declarations

Author(s) declare that all works are original and this manuscript has not been published in any other journal.

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